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10/785,292	02/23/2004	Tamer Kadous	030300	2073

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EXAMINER	
HOM, SHICK C	

ART UNIT	PAPER NUMBER
2416	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/785,292	KADOUS, TAMER	
	Examiner	Art Unit	
	ANKIT P. GANDHI	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 December 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-63* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-63* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _____ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-63 are rejected under 35 U.S.C. 102(e) as being anticipated by Tarokh et. al., Pub. No.: US 2004/0057530

Regarding Claims 1, 23, 28, 31, 46, 57, 61, Tarokh discloses a method of receiving an incremental redundancy (IR) transmission on a plurality of parallel channels in a wireless multiple-input multiple-output (MIMO) communication system, comprising:

obtaining a plurality of symbol blocks for a plurality of data packets transmitted on the plurality of parallel channels in a current period, one symbol block for each data packet and one data packet for each parallel channel, wherein multiples symbol blocks are generated for each data packet and transmitted one symbol block at a time on an associated parallel channel **(abstract, column: 3; 0025, fig. 2 comprising base station comprising the base station 14 comprising a control system 20, a baseband processor 22, transmit circuitry 24, receive circuitry 26, multiple antennas 28, and a network interface 30, whereas the receive circuitry 26 receives radio frequency signals through the antennas 28 bearing information from one or more remote transmitters provided by mobile terminals 16, column 5; 0053)**

selecting one of the plurality of parallel channels for recovery; decoding all symbol blocks obtained for a data packet, transmitted on the selected parallel channel to obtain a decoded packet; determining whether the data packet transmitted on the selected parallel channel is recovered based on the decoded packet; terminating the obtaining, decoding, and determining for the data packet transmitted on the selected parallel channel, if the data packet is recovered or if all of the multiple symbol blocks have been obtained for the data packet; and estimating and canceling interference due to the data packet transmitted on the selected parallel channel, if the data packet is recovered **(column 6; 0061-0062 & 0064, lines 1-6 comprising recovering transmitted symbols, decoding control signal, placing back recovered symbol using de-interleaver logic 90, and also further being explained in column 6; 0065-0066 comprising first transmission period via first and second transmit antennas, and paragraph 0067, 0078, 0080, 0085-86, 0088, and fig. 13 comprising block re-transmission technique, wherein space-time trellis codes are used to provide incremental redundancy, and paragraph 0103-0104, wherein as it is disclosed above in cited reference comprising; first and second transmission period, retransmission symbols being the first set of original symbols encoded for transmission from the antennas, provide spatial diversity and sending request to transmit the retransmission symbols comprising space-time decoder to recover original symbols, and paragraph 0057 and 0059-0060 comprising channel estimation and interference suppression, and claim 21, 23, 25 and 28).**

Regarding claims 3 and 24, Tarokh discloses the transmitter of claim 23, wherein the controller is further operative to receive an indication that the first data packet has been

recovered; estimate throughput for the first and second parallel channels with no transmission on the first parallel channel until the second data packet is recovered; estimate throughput for the first and second parallel channels with transmission of a new data packet on the first parallel channel after the first data packet; and initiate transmission of the new data packet on the first parallel channel if the throughput with transmission on the first parallel channel is greater than the throughput with no transmission on the first parallel channel (column 5, paragraph 0055, 0057 and 0060)

Regarding claim 25, Tarokh discloses the transmitter of claim 23, wherein the data processor is further operative to process a third data packet to obtain a third plurality of symbol blocks, and wherein the controller is further operative to initiate transmission of the third plurality of symbol blocks, one symbol block at a time, on the first parallel channel upon receiving an indication that the first data packet has been recovered (column 8, paragraph 0085)

Regarding claim 26, Tarokh discloses the transmitter of claim 23, wherein the data processor is operative to encode the first data packet in accordance with a coding scheme indicated by a rate selected for the first parallel channel to obtain a coded packet, partition the coded packet into a plurality of coded subpackets, and modulate the plurality of coded subpackets in accordance with a modulation scheme indicated by the rate to obtain the first plurality of symbol blocks (as it is disclosed in abstract, and further illustrated in column 3, paragraph 0042, and column 5, paragraph 0051 and 0053)

Regarding claim 27, Tarokh discloses the transmitter of claim 23, further comprising: a spatial processor operative to receive at least one symbol block, selected from among the first and second pluralities of symbol blocks, for transmission in one time slot on the first and second

parallel channels and to spatially process the at least one symbol block with a transmit basis matrix to obtain a plurality of transmit symbol sequences for a plurality of transmit antennas (column 7, paragraph 0071-0074)

Regarding claims 29-30, and 42-43 Tarokh discloses the apparatus of claim 28, further comprising: means for processing a third data packet to obtain a set of at least one symbol block for the third data packet; and means for transmitting the set of at least one symbol block, one symbol block at a time, on the first parallel channel upon receiving an indication that the first data packet has been recovered (column 8, paragraph 0085-0087)

Regarding claim 32, Tarokh discloses the same limitation as disclosed above in claim 1, therefore respectively rejected under the same basis.

Regarding claim 33, Tarokh discloses the method of claim 31, further comprising: performing detection on a plurality of received symbol sequences for a plurality of receive antennas to obtain the symbol block for the first data packet and the symbol block for the second data packet (as disclosed in claim 1, 10, 14-16, and 18)

Regarding claim 34, Tarokh discloses the method of claim 33, wherein the detection is performed based on a minimum mean square error (MMSE) detector, a maximal ratio combining (MRC) detector, or a linear zero-forcing (ZF) detector (column 8, paragraph 0080, 0083, and column 9, paragraph 0094)

Regarding claim 35, Tarokh discloses the method of claim 31, wherein the receiving, decoding, determining, and terminating for the first data packet are performed independently of

the receiving, decoding, determining, and terminating for the second data packet (as it is disclosed in claim 1).

Regarding claim 36, Tarokh discloses the method of claim 31, wherein the first data packet is designated to be recovered before the second data packet, and wherein the decoding, determining, and terminating for the second data packet are not performed until the first data packet is recovered (as it is disclosed in claim 1).

Regarding claims 37 and 63, Tarokh discloses the method of claim 31, further comprising: if the first data packet is recovered, estimating interference due to the first data packet on the second data packet, and canceling the interference due to the first data packet from symbol blocks received for the second data packet, and wherein all symbol blocks received for the second data packet, with the interference from the first data packet canceled, are decoded to obtain the second decoded packet (claim 37 teaches the same limitation as disclosed above, therefore respectively rejected under the same basis).

Regarding claim 38 and claim 39-40, Tarokh discloses the same limitation as disclosed above, and further also illustrated in column 5, paragraph 0055, 0057 and 0060.

Regarding claim 41, Tarokh discloses the method of claim 39, wherein the third data packet is expected to be recovered at or before a time instant when the second data packet is expected to be recovered.

Regarding claims 44 and 60, Tarokh discloses the method of claim 31, further comprising: obtaining signal-to-noise-and-interference ratio (SINR) estimates for the first and second parallel channels; and selecting a first rate for the first parallel channel and a second rate

for the second parallel channel based on the SINR estimates, and wherein the first and second data packets are decoded in accordance with the first and second rates, respectively (column 5, paragraph 0059)

Regarding claim 45, Tarokh discloses the method of claim 31, further comprising: sending an acknowledgment (ACK) if the first data packet is recovered or a negative acknowledgment (NAK) if the first data packet is not recovered (column 3, paragraph 0024)

Regarding claims 47 and 53, Tarokh discloses the method of claim 46, wherein a parallel channel with a highest likelihood of being recovered, among the plurality of parallel channels, is selected for recovery (as it is disclosed the same limitation as disclosed above, further it is obvious to one skilled in the art that such system inherently have the highest like hood of being recovered among the plurality of parallel channels).

Regarding claim 48, Tarokh discloses the method of claim 46, wherein a parallel channel that is last recovered furthest away in time from the current period, among the plurality of parallel channels, is selected for recovery (as it is disclosed the same limitation as disclosed above, further it is obvious to one skilled in the art that such system inherently perform parallel channel that is last recovered furthest away in time from the current period among all the plurality of parallel channels that is selected for recovery).

Regarding claim 49, Tarokh discloses the method of claim 46, wherein a parallel channel with a highest number of data symbol blocks in the current period, among the plurality of parallel channels, is selected for recovery (column 6, paragraph 0065)

Regarding claims 50 and 52, Tarokh discloses the method of claim 46, wherein the selecting, decoding, determining, terminating, and estimating and canceling are performed for each of the plurality of parallel channels in the current period (as it discloses the same limitation as disclosed above, and further it is obvious due to factors explained above, and system inherently selects plurality of parallel channels for decoding, determining, terminating, estimating and canceling for current period of time).

Regarding claims 51 and 54, Tarokh discloses the method of claim 46, wherein the selecting, decoding, determining, terminating, and estimating and canceling are performed for the plurality of parallel channels, one parallel channel at a time and in a cycled order, the cycled order being defined such that one or more parallels most recently recovered are placed last and are recovered last subsequently (column 8, paragraph 0062, and figure 7, paragraph 0068)

Regarding claims 55, Tarokh discloses the method of claim 46, wherein the plurality of parallel channels have similar signal-to-noise-and-interference ratios (SINRs) after linear detection at a receiver (column 7, paragraph 0068)

Regarding claims 20 and 56, Tarokh discloses the method of claim 46, wherein the plurality of parallel channels are formed by transmitting diagonally across a plurality of subbands of a plurality of transmit antennas (as shown in figure 10-12)

Regarding claim 58, Tarokh discloses the receiver of claim 57, further comprising: a spatial processor operative to receive a plurality of symbol sequences for a plurality of receive antennas and perform detection on the plurality of received symbol sequences to obtain the

symbol block for the first data packet and the symbol block for the second data packet (as it is disclosed in claim 1 above, therefore respectively rejected under the same basis).

Regarding claim 59, Tarokh discloses the receiver of claim 58, wherein the spatial processor is operative to, if the first data packet is recovered, estimate interference due to the first data packet on the second data packet and cancel the interference due to the first data packet from symbol blocks received for the second data packet, and wherein the data processor is operative to decode all symbol blocks received for the second data packet, with the interference from the first data packet canceled, to obtain the second decoded packet (as it is disclosed in claim 1 above, therefore respectively rejected under the same basis).

Regarding claim 62, Tarokh discloses the apparatus of claim 61, further comprising: means for receiving a plurality of symbol sequences for a plurality of receive antennas; and means for performing detection on the plurality of received symbol sequences to obtain the symbol block for the first data packet and the symbol block for the second data packet (as it is disclosed in claim 1 above, therefore respectively rejected under the same basis).

Regarding claims 2 and 22, Tarokh discloses the method of claim 1, further comprising: processing a third data packet to obtain a third plurality of symbol blocks; transmitting the third plurality of symbol blocks, one symbol block at a time, on a third parallel channel to the receiver; and terminating transmission of the third plurality of symbol blocks early if the third data packet is recovered by the receiver with fewer than all of the third plurality of symbol blocks (as it teaches the same limitation as disclosed above, and as well further explained in column 8, paragraph 0084-0087).

Regarding claim 4, Tarokh discloses the method of claim 1, further comprising: receiving an indication that the first data packet has been recovered; and transmitting no data packets on the first parallel channel until the second data packet is recovered (as it teaches the same limitation as disclosed above, therefore respectively rejected under the same basis).

Regarding claims 5 and 10, Tarokh discloses the method of claim 4, wherein symbol blocks for the second data packet are transmitted at full transmit power after terminating transmission of the first plurality of symbol blocks for the first data packet (column 4, paragraph 0046, 0049, and 0051).

Regarding claim 6, Tarokh discloses the method of claim 1, further comprising: receiving an indication that the first data packet has been recovered; processing a third data packet to obtain a set of at least one symbol block for the third data packet; and transmitting the set of at least one symbol block, one symbol block at a time, on the first parallel channel (as it teaches the same limitation as disclosed above, and as well further explained in column 8, paragraph 0084-0087).

Regarding claim 7, Tarokh discloses the method of claim 6, wherein the third data packet is expected to be recovered by the receiver at or before a time instant when the second data packet is expected to be recovered (as it teaches the same limitation as disclosed above, and as well further explained in column 8, paragraph 0084-0087).

Regarding claim 8, Tarokh discloses the method of claim 6, wherein the third data packet is expected to be recovered by the receiver after a time instant when the second data

packet is expected to be recovered (as it discloses the same limitation as disclosed above, therefore respectively rejected under the same basis).

Regarding claim 9, Tarokh discloses the method of claim 8, further comprising: terminating transmission of the second plurality of symbol blocks after a predetermined number of symbol blocks (as it discloses the same limitation as disclosed above, and further it is obvious to one skilled in the art that such system inherently transmit second plurality of symbol blocks after a predetermined number of symbol blocks).

Regarding claim 11, Tarokh discloses the method of claim 1, further comprising: receiving an indication that the first data packet has been recovered; processing a third data packet to obtain a third plurality of symbol blocks for the third data packet; transmitting the third plurality of symbol blocks, one symbol block at a time, on the first parallel channel after the first data packet; receiving an indication that the second data packet has been recovered; processing a fourth data packet to obtain a fourth plurality of symbol blocks; and transmitting the fourth plurality of symbol blocks, one symbol block at a time, on the second parallel channel after the second data packet (as it teaches the same limitation as disclosed above and further in details with claim 1, and further explained in column 8, paragraph 0084-0087)

Regarding claim 12, Tarokh discloses the method of claim 1, further comprising: receiving a first rate for the first parallel channel and a second rate for the second parallel channel, and wherein the first and second data packets are processed in accordance with the first and second rates, respectively (as it disclosed in claim 1, which teaches the same limitation as disclosed above therefore respectively rejected under the same basis)

Regarding claim 13, Tarokh discloses the method of claim 12, wherein the processing the first data packet includes encoding the first data packet in accordance with a coding scheme indicated by the first rate to obtain a coded packet, partitioning the coded packet into a plurality of coded subpackets, and modulating the plurality of coded subpackets in accordance with a modulation scheme indicated by the first rate to obtain the first plurality of symbol blocks (column 4, paragraph 0045-0046, and 0048-0049, and further illustrated in column 5-6, paragraph 0058, and 0062)

Regarding claim 14, Tarokh discloses the method of claim 1, wherein one symbol block in the first plurality of symbol blocks includes all systematic bits for the first data packet and is transmitted first for the first data packet (column 4, paragraph 0045-0046)

Regarding claim 15, Tarokh discloses the method of claim 1, further comprising: receiving at least one symbol block, selected from among the first and second pluralities of symbol blocks, for transmission in one time slot on the first and second parallel channels; and spatially processing the at least one symbol block with a transmit basis matrix to obtain a plurality of transmit symbol sequences for a plurality of transmit antennas (column 7, paragraph 0071-0074)

Regarding claim 16, Tarokh discloses the method of claim 1, wherein the first and second parallel channels are formed so as to achieve similar signal-to-noise-and-interference ratios (SINRs) after linear detection at the receiver (column 5, paragraph 0059)

Regarding claim 17, Tarokh discloses the method of claim 1, wherein the first and second parallel channels correspond to first and second transmit antennas at a transmitter in the

MIMO system (as it disclosed in claim 1, which teaches the same limitation as disclosed, therefore respectively rejected under the same basis)

Regarding claim 18, Tarokh discloses the method of claim 1, wherein the first and second parallel channels correspond to first and second spatial channels in the MIMO system (as it disclosed in claim 1, which teaches the same limitation as disclosed, therefore respectively rejected under the same basis)

Regarding claims 19 and 21, Tarokh discloses the method of claim 1, wherein the MIMO system implements orthogonal frequency division multiplexing (OFDM), and wherein each of the first and second parallel channels is formed with a plurality of subbands and a plurality of transmit antennas (it is obvious to one skilled in the art that such system inherently disclosed OFDM (column 4, paragraph 0050), and further disclosed in claim 1 as explained above, therefore respectively rejected under the same basis)

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANKIT P. GANDHI whose telephone number is (571)270-3009. The examiner can normally be reached on Monday-Friday - 9:00 to 5:00 (Altern: Friday Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on 571-272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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